The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board

Paper No. 28

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

MAILED
MAR 16 2005
U.S. PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte THOMAS C. ANTHONY

Appeal No. 2004-2166
Application No. 09/492,557

ON BRIEF

Before Owens, Ruggiero, and Blankenship, *Administrative Patent Judges.*

Owens, *Administrative Patent Judge.*

DECISION ON APPEAL

This appeal is from the final rejection of claims 34-42. Claims 16-22, which are all of the other pending claims, stand withdrawn from consideration by the examiner as claiming a nonelected invention.

THE INVENTION

The appellant claims a magnetic memory having a keeper structure for preventing disruptions to magnetization in a sense layer. Claim 34 is illustrative:

> A magnetic memory, comprising:
> magnetic memory cell including a sense layer having an easy axis;
> keeper structure for applying magnetic fields using exchange coupling to a pair of edge regions of the sense layer that force magnetizations in the edge regions to have a substantially similar direction which is substantially perpendicular to the easy axis of the sense layer, the keeper structure having a proximity to the sense layer which provides a flux closure path between the edge regions.

RE*FERENCES*

Torok et al. (Torok)	5,587,943	Dec. 24, 1996
Chen et al. (Chen)	5,748,524	May 5, 1998
Hurst et al. (Hurst)	5,956,267	Sep. 21, 1999

Amikam Aharoni, *Introduction to the Theory of Ferromagnetism* 16 (Clarendon Press 1996).

THE REJECTIONS

The claims stand rejected as follows: claims 34-36, 38, 40 and 41 under 35 U.S.C. § 102(b) as anticipated by Chen considered with Aharoni; claims 34, 37 and 39 under 35 U.S.C. § 102(e) as anticipated by Hurst; claims 34, 37 and 39 under 35 U.S.C. § 103

as obvious over Hurst considered with Chen; and claim 42 under 35 U.S.C. § 103 as obvious over Chen in view of Torok.

OPINION

We reverse the aforementioned rejections. We need to address only the sole independent claim, i.e., claim 34.[1]

Rejection over Chen considered with Aharoni

The appellant's claim 34 requires a keeper structure having a proximity to a sense layer which provides a flux closure path between the edge regions of the sense layer.

Chen applies a magnetic field to the ends of a layer of magnetic material in a magnetic memory cell to move magnetic end vectors in the magnetic material at the ends into a fixed direction, and disposes pinning material adjacent to the ends to maintain the magnetic end vectors in the magnetic material at the ends in the fixed direction (col. 2, lines 30-35; figure 5). The pinning material is positioned adjacent only to the ends so as to not affect the magnetic material in the major domain or domains between the ends (col. 4, lines 52-55).[2]

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[1] The examiner does not rely upon Torok for any disclosure that remedies the deficiency in Chen as to the independent claim (answer, pages 8-9).

[2] The examiner relies upon Aharoni for the meaning of "exchange" and "exchange energy" (answer, page 4).

The examiner argues that Chen discloses "a path for magnetic flux transport between a pair of opposing edge regions of the sense layer (col. 4, lines 41-44)" (answer, page 4). The relied-upon portion of Chen discloses that "[g]enerally, it is desirable to pin magnetic end vectors **28** and **29** in an orientation substantially perpendicular to the length, or parallel to width W so as to reduce the end effects and at least partially close the magnetic loops." The closed magnetic loops are at the ends and are formed by minor magnetic end vectors (col. 3, lines 1-9). Chen does not disclose that the magnetic loops are between the ends.

The examiner argues that a magnetic field inherently exists between the ends of Chen's magnetic material regardless of the form, direction or strength of the magnetic fields at the ends (answer, pages 9-15). An inherent characteristic must be inevitable, and not merely a possibility or probability. *See In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981). The examiner has not provided evidence that a magnetic field inevitably extends between the ends of Chen's magnetic material.

We therefore find that the examiner has not carried the burden of establishing a *prima facie* case of the appellant's claimed invention by Chen.

Rejection over Hurst

The appellant's claim 34 requires a keeper structure for applying magnetic fields using exchange coupling to a pair of edge regions of a sense layer.

Hurst discloses a magnetic memory having a word line (120) that has a magnetic field keeper (122) on its bottom surface and side walls and is separated at its upper surface from a bit region (132) by a thin dielectric material (col. 3, lines 9-12; col. 7, lines 6-14; figure 16).

The examiner argues that the appellant's specification (page 12, lines 5-14) indicates that exchange coupling occurs between a keeper structure and a sense layer even if there are intervening seed, reference and dielectric layers (answer, page 24). What the specification teaches is that when there is an intervening reference layer there is no exchange coupling between the keeper structure and the sense layer (page 9, lines 18-24).

The examiner argues that the keeper structures of the appellant and Hurst have the same proximity to the sense layer (answer, page 15). The examiner, however, has not established that when there is a dielectric layer, such as that of Hurst, between a keeper structure and a sense layer, there is exchange

coupling the keeper structure and the sense layer. Moreover, the examiner has not established that Hurst does not have a reference layer between the keeper structure and the sense layer.

The examiner argues that the keeper structure of Hurst performs the same function as the appellant's keeper structure of pinning end vectors of the sense layer (answer, page 15). In support of this argument the examiner relies upon column 7, lines 32-34 of Hurst, which states: "In most cases, the magneto-resistive material has edge domains that are magnetized in a particular direction, regardless of whether the incident magnetic field is applied." This disclosure merely states that the edge domains are magnetized in a particular direction. It does not state that the end vectors are pinned in that direction by the keeper structure.

The examiner, therefore, has not established a *prima facie* case of anticipation of the appellant's claimed invention by Hurst.

Rejection over Hurst considered with Chen

The examiner argues (answer, pages 7-8):

> It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a soft or hard ferromagnetic material to stabilize the magnetization of the edge regions of the sense layer in **Hurst** in a direction perpendicular to the easy

> axis of the sense layer and to use a hard ferromagnetic material as taught by **Chen** for the beneficial reasons indicated therein, because stabilized end regions improves [sic] the magnetic memory over one which does not have stabilized end regions, as taught in both **Hurst** and **Chen**.

As discussed above, the portion of Hurst relied upon by the examiner as disclosing stabilized edge regions does not provide such a disclosure. Hurst uses a soft ferromagnetic keeper structure to concentrate a magnetic field above a word line (col. 5, lines 31-33; col. 7, lines 6-15). Chen stabilizes magnetic end vectors using an antiferromagnetic material or a hard or permanent magnetic material (col. 4, lines 58-63). The examiner has not established that if Chen's hard or permanent magnetic material were positioned at the ends of Hurst's sense layer, there would be exchange coupling between the sense layer and the keeper structure through the dielectric layer. Also, the examiner has not established that Hurst does not have, between the keeper structure and the sense layer, a reference layer that would prevent exchange coupling between the keeper structure and the sense layer.

The examiner argues (answer, page 8):

> Alternatively, the prior art of **Chen**, as explained above, discloses each of the claimed features except for indicating that the keeper structure is in a U shape which encases the read/write conductors (i.e. the word line).

> It would have been obvious for one of ordinary skill in the art, at the time of the invention[,] to modify the structure of **Chen** to form the U-shape of **Hurst**, for the reasons indicated in **Hurst**, at least at col. 7, lines 6-15, to more effectively concentrate the magnetic field above the word line than could be obtained by a keeper structure not formed in a U shape and encasing the word line.

Chen, however, teaches that "[p]inning material **30** is positioned adjacent only to the ends, so as not to effect [sic] the magnetic material in the major domain or domains between the ends" (col. 4, lines 52-55). The examiner has not established that, regardless of this teaching, one of ordinary skill in the art would have been led by the applied prior art to place Chin's pinning material between the ends.

For the above reasons we conclude that the examiner has not carried the burden of establishing a *prima facie* case of obviousness of the appellant's claimed invention.

DECISION

The rejections of claims 34-36, 38, 40 and 41 under 35 U.S.C. § 102(b) over Chen considered with Aharoni, claims 34, 37 and 39 under 35 U.S.C. § 102(e) over Hurst, claims 34, 37

and 39 under 35 U.S.C. § 103 over Hurst considered with Chen, and claim 42 under 35 U.S.C. § 103 over Chen in view of Torok, are reversed.

REVERSED

TERRY J. OWENS)
Administrative Patent Judge)
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